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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/680,302	10/08/2003	Atsushi Iwata	2635-183	5485

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EXAMINER	
BAREFORD, KATHERINE A	
ART UNIT	**PAPER NUMBER**
1762	

DATE MAILED: 02/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/680,302	IWATA, ATSUSHI	
	Examiner	Art Unit	
	Katherine A. Bareford	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claims 1-4 are canceled

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The amendment of January 17, 2006 has been received and entered.

The Examiner notes that claims 1-4 have been canceled, leaving claims 5-7 pending for examination.

Election/Restrictions

1. Applicant's election of Group II, claims 5-7 in the reply filed on January 17, 2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

The Examiner notes that non-elected claims 1-4 have been canceled.

Specification

2. The abstract of the disclosure provided January 17, 2006 is approved.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 5-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which

was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 5 has been amended in the last four lines to require ". . . and on the basis of this determined thickness, controlling the amount of spray of the protective-layer material in the plasma thermal-spraying equipment for forming a subsequent protective layer to form said subsequent protective layer to a desired thickness." Applicant refers to pages 19-20 (and claim 6) as supporting this amendment as to which article protective layer thickness is controlled. Applicant argues that while in claim 6 the electrode may be the immediately following electrode, the invention of claim 5 is not necessarily limited to an "immediately following" electrode, but rather a subsequent protective layer, which could be on the same or a subsequent electrode However, the support on pages 19-20 is only to controlling the spray based on the determination for the immediately next gas sensor element. A review of the disclosure as originally filed provides no indication of adjusting during coating of the same electrode, for example, and thus the amendment contains new matter.

5. The rejection of claims 5-7 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention is withdrawn due to applicant's amendments of January 17, 2006 to claims 5 and 7 to resolve the issues raised.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted state of the prior art in view of Japan 2000-282214 (hereinafter '214), GB 2 138 562 A (hereinafter '562), Friese et al (US 5731030) and Yamada et al (US 2002/0018921).

The admitted state of the prior art, at pages 1-3 of the specification, teaches that when manufacturing gas sensor elements, it is known to provide a cylindrical and substantially tumbler-shaped solid-electrolyte body which has a closed-end head portion, and on the side opposite to the head portion, an open-ended base tail portion. An electrode is provided on the surface of the solid-electrolyte body. A porous protective layer is provided that covers the surface of the electrode. In formation, plasma thermal spraying can be used to form the protective layer, which would provide spraying a molten protective layer material on the electrode covered surface of the solid-electrolyte body. The admitted state of the prior art further teaches that the solid-electrolyte bodies have uneven surfaces, and hence electrodes formed on the surfaces of such bodies also have uneven surfaces reflecting the uneven surfaces of the solid-

electrolyte bodies. Thus, it has been difficult to deal with the problem of non-uniform coatings when forming the protective layers.

The admitted state of the prior art teaches all the features of these claims (1) except for how to provide the even coating by measuring radii as claimed and controlling thickness based on these measurements and (2) the multiple sensor manufacturing and feedback control based on the last sensor made.

However, '214 teaches a method of thermal spray coating (which includes plasma spray coating) onto cylindrical shaped bodies. Abstract, paragraph [0002] and figure 1. Coating thickness can be controlled to provide a uniform coating. Abstract and paragraph [0006]. The process includes rotating the body to be coated and measuring distance to a distance measuring head at multiple points as the body is rotated around its axis. Abstract, figure 1 and paragraphs [0013]—[0015]. This would include measuring distances selected along a peripheral circle C on the surface of the body. Abstract, figure 1 and paragraphs [0013]—[0015] (note the rotation). Then thermal spraying occurs, whereby a layer is sprayed onto the surface. Abstract. After spraying, the distance to the distance measuring head is again measured at multiple points on the body. Abstract and figure 1. The first measured distances and the second measured distances are compared to judge whether the required film thickness has been achieved. Abstract and paragraph [0006]. This allows controlling the amount of spray based on these measurements until the desired thickness has been achieved. Abstract and paragraph [0006].

'562 teaches a method of measuring the profile of an irregular shaped article using a measuring system. Page 1, lines 1-10. The measuring system rotates a head H around the axis of the article and performing a series of measurements around the cross-sectional area of the product. Page 1, lines 100-110. As the rotating head H goes through one complete cycle (180 degrees of rotation) a series of profile measurements are made which represent the ordinates of the profile of the material. Page 1, lines 100-110.The measurements are of the diameter of the article. page 1, lines 85-90 and page 2, lines 5-25 and page 2, lines 75-85. The measurements can be taken before coating and then again after coating. Page 2, lines 90-100 and page 3, lines 70-75. The measurements are compared to determine the coating thickness. Page 2, lines 90-100. The comparison of measurements can be used to control the amount of coating applied in a closed loop control. Page 2, lines 80-90. The measurements determined can be the average thickness applied. Page 2, lines 90-100 and 120-126.

Friese teaches the thermal spraying of substrates such as oxygen (gas) sensors. Column 3, lines 10-15. The parts are sprayed in a mass production process. Column 3, lines 10-15. Friese teaches providing a measuring and testing system to control the thickness of the applied coating. Column 3, lines 15-50 and figure 1. Friese further teaches that this measuring and testing system can be used to provide feedback control based on the last sensor made. Column 2, lines 20-30. Friese also teaches that in the coating of parts in mass production it would be desirable to determine the layer thickness, or at least an average layer thickness, so control measures can be taken

immediately (with the next part, for example). Column 1, line 65 through column 2, line 10.

Yamada teaches a method where a substrate is thermally sprayed. Paragraphs [0071] and [0160]. Yamada teaches that the thickness of the sprayed film can be determined by a method of calculating average thickness, by measuring the thickness of a sample substrate before and after spraying at multiple points and calculating the average measurement value in the difference in the thickness of the sample between before and after the measurement among the multiple points. Paragraph [0161].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the admitted state of the prior art to provide a measuring system as suggested by '214 and '562 in order to provide a desirably uniform coating, because the admitted state of the art teaches to thermal spray a cylindrical object such as a gas sensor and a desire to provide a uniform coating on the sensor, and '214 teaches the desire to use measurements at multiple points before and after coating when thermal spraying a cylinder in order to control the coating thickness applied over the surface of the cylinder, and '562 provides a further desirable method of measuring the diameter of an article at different points before and after coating to provide for optimization of the coating thickness. As a result, the combination of the references would provide that a desirable method would be to measure the diameter (which also provides measurements of the corresponding radii) of the surface to be coated at a variety of points while rotating the body (as shown by '214 and '562 either the body or

the measuring device should be rotated relative to the other) before coating, then applying the coating, and then performing the measurements again. Then, the results can be compared to control the application of the coating to give a final, uniform layer of coating. As to the position of measurements of claim 7, '562 provides for measuring at various points up to 180 degrees as required by claim 7. As to the exact number of points to be measured, one of ordinary skill in the art would perform routine experimentation to determine the optimum number for the specific substrate to be used.

It would further have been obvious to one of ordinary skill in the art at the time the invention was made to modify the admitted state of the prior art in view of '214 and '562 to provide for mass production manufacturing of the sensors and to use the thickness control to provide feedback control based on measurements of average thickness from the last sensor made as suggested by Friese and Yamada, in order to provide rapid and controlled manufacture, because the admitted state of the prior art in view of '214 and '562 teaches a thermal spraying method for controlling thickness when coating gas sensors and '562 teaches that multiple point measurement can be used to determine average thickness and Friese teaches that when providing a thermal spraying method for controlling thickness when coating gas sensors, it is desired to provide for mass production manufacturing of the sensors and to use the thickness control to provide feedback control based on measurements from the last sensor made and further teaches that it would be desirable to use an average determined thickness of the coating for feedback control, and Yamada teaches that a known method of determining average

thickness using multiple point measurement is to calculate the average measurement value in the difference between the thickness of the article before and after among the totality of points. Thus, the combination of the references would provide that a desirable method would be to measure the diameter (which also provides measurements of the corresponding radii) of the surface to be coated at a variety of points while rotating the body before coating, then applying the coating, and then performing the measurements again, and then determining the average thickness by determining a average of differences between the after and before measurements at corresponding points, and using this average thickness to control feedback (as suggested by Friese).

Response to Arguments

8. Applicant's arguments with respect to claims 5-7 have been considered but are moot in view of the new ground(s) of rejection.

The Examiner has provided Yamada as to the now claimed "determining an average of differences . . . " as claimed in claim 5, and the Examiner also notes the citation to Friese as to the use of the average thickness for feedback control.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KATHERINE BAREFORD
PRIMARY EXAMINER